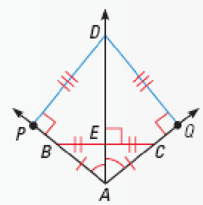
Geometry Date_____ Unit 5 Review: Properties of Triangles

1. What is your name?

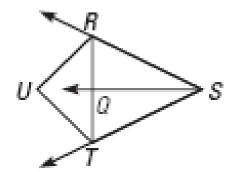
5.1 Perpendiculars and Bisectors

Examples on pp. 264–267

EXAMPLES In the figure, $\overrightarrow{AD}$ is the angle bisector of $\angle BAC$ and the perpendicular bisector of $\overline{BC}$. You know that $BE = CE$ by the definition of perpendicular bisector and that $AB = AC$ by the Perpendicular Bisector Theorem. Because $\overline{DP} \perp \overrightarrow{AP}$ and $\overline{DQ} \perp \overrightarrow{AQ}$, then DP and DQ are the distances from D to the sides of $\angle PAQ$ and you know that $DP = DQ$ by the Angle Bisector Theorem.



2. If $\overleftrightarrow{SQ}$ is the perpendicular bisector of $\overline{RT}$, explain how you know that $\overline{RQ} \cong \overline{TQ}$ & $\overline{RS} \cong \overline{TS}$.



Concurrecy of ⊥ bisector theorem.

3. If $\overline{UR} \cong \overline{UT}$, what can you conclude about U?

U is on the ⊥ bisector.

4. If Q is equidistant from $\overrightarrow{SR}$ & $\overrightarrow{ST}$, what can conclude about Q?

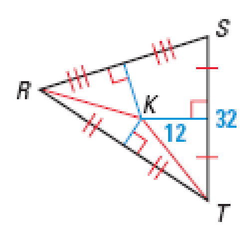
Q is on the angle bisector.

5.2 Bisectors of a Triangle

Examples on pp. 272–274

EXAMPLES The perpendicular bisectors of a triangle intersect at the *circumcenter*, which is equidistant from the vertices of the triangle. The angle bisectors of a triangle intersect at the *incenter*, which is equidistant from the sides of the triangle.

5. The perpendicular bisectors of $\triangle RST$ intersect at K. Find KR.



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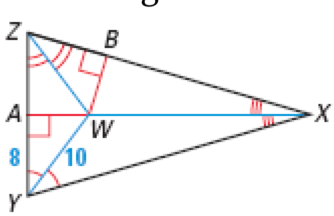
6. The angle bisectors of $\triangle XYZ$ intersect at W. Find WB.



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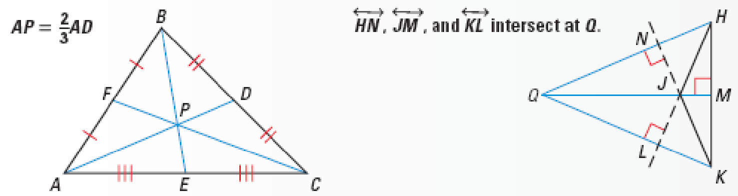
5.3 MEDIANS AND ALTITUDES OF A TRIANGLE

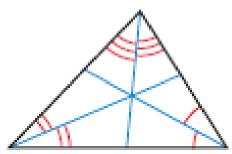
Examples on pp. 279–281

EXAMPLES The medians of a triangle intersect at the centroid. The lines containing the altitudes of a triangle intersect at the orthocenter.



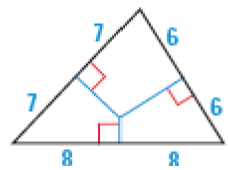
Name the special segments and point of concurrency of the triangle.

7.



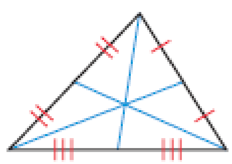
Angle bisector
incenter

8.



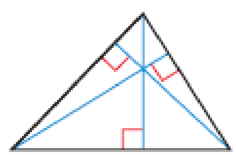
⊥ bisector
Circumcenter

9.



Medians
Centroid

10.



altitude
orthocenter

$\triangle XYZ$ has vertices X(0, 0), Y(-4, 0), and Z(0, 6). Find the coordinates of the indicated point.

11. The centroid of $\triangle XYZ$.

$\left(-\frac{4}{3}, 2\right)$

12. The orthocenter of $\triangle XYZ$.

$(0, 0)$

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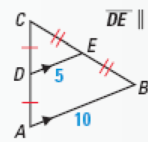
5.4 MIDSEGMENT THEOREM

Examples on pp. 287–289

EXAMPLES A midsegment of a triangle connects the midpoints of two sides of the triangle. By the Midsegment Theorem, a midsegment of a triangle is parallel to the third side and its length is half the length of the third side.



$\overline{DE} \parallel \overline{AB}$, $DE = \frac{1}{2}AB$

The midpoints of the sides of $\triangle HJK$ are L(4, 3), M(8, 3) & N(6, 1).

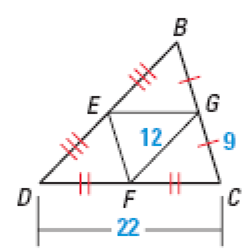
13. What are the coordinates of the vertices of the triangle?

(2,1), (6,5) & (10,1)

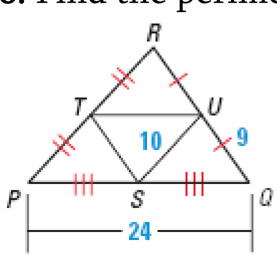
14. Show that each midsegment is parallel to a side of the triangle.

0, -1, & 1

15. Find the perimeter of $\triangle BCD$. 64



16. Find the perimeter of $\triangle STU$.



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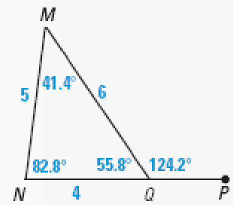
5.5 INEQUALITIES IN ONE TRIANGLE

Examples on pp. 295–297

EXAMPLES In a triangle, the side and the angle of greatest measurement are always opposite each other. In the diagram, the largest angle, $\angle MNQ$, is opposite the longest side, $\overline{MQ}$.

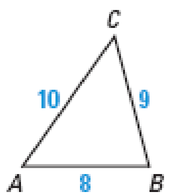
By the Exterior Angle Inequality, $m\angle MQP > m\angle N$ and $m\angle MQP > m\angle M$.

By the Triangle Inequality, $MN + NQ > MQ$, $NQ + MQ > MN$, and $MN + MQ > NQ$.



Write the angle and side measurements in order from least to greatest.

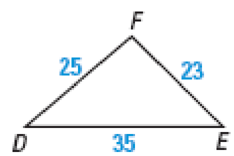
17.



$\angle C, \angle A, \angle B$

$\overline{AB}, \overline{BC}, \overline{AC}$

18.

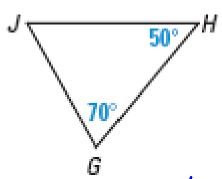


$\angle D, \angle E, \angle F$

EF, DF, DE

19.

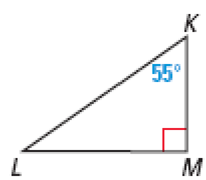
19.



$\angle H, \angle J, \angle G$

$\overline{JG}, \overline{GH}, \overline{JH}$

20.



$\angle L, \angle K, \angle M$

$\overline{KM}, \overline{LM}, \overline{KL}$

21. You are enclosing a triangular garden region with a fence. You have measured two sides of the garden to be 100 feet and 200 feet. What is the maximum length of fencing you need? Explain.

600 ft, The third side must be less than 300 ft.

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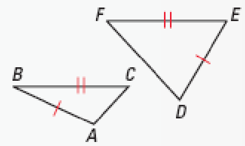
5.6 INDIRECT PROOF AND INEQUALITIES IN TWO TRIANGLES

Examples on pp. 302–304

EXAMPLES $\overline{AB} \cong \overline{DE}$ and $\overline{BC} \cong \overline{EF}$

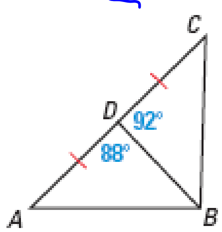
Hinge Theorem: If $m\angle E > m\angle B$, then $DF > AC$.

Converse of the Hinge Theorem: If $DF > AC$, then $m\angle E > m\angle B$.

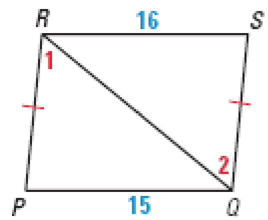


Complete each statement with <, > or =.

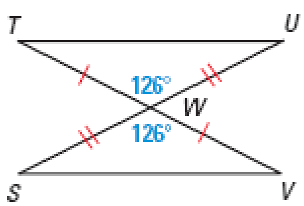
22. AB < CB



23. $m\measuredangle 1$ < $m\measuredangle 2$



24. TU = VS



25. Write the first statement for an indirect proof of: In $\triangle MPQ$, if $\measuredangle M \cong \measuredangle Q$, then $\triangle MPQ$ is isosceles.

Assume ΔMPQ is not isosceles.

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26. Write an indirect proof to show that no triangle has two right angles.

Assume a triangle has 2 rt angles.